

An Autosegmental Analysis of Verbal Tone in Mushunguli

Honors Research Thesis

Presented in Partial Fulfillment of the Requirements for graduation  
*with Honors Research Distinction in Linguistics* in the undergraduate colleges of  
The Ohio State University

by  
Elizabeth Pillion

The Ohio State University  
April 2013

Project Advisors: Dr. Robert Levine and Dr. David Odden, Department of Linguistics

## **Abstract**

Mushunguli is a Bantu language spoken in southern Somalia by a population of around 20,000 people. This study attempts to explain the underlying morphological and phonological processes that contribute to the tone found in some verbal forms of this language. This study was conducted through interviews and elicitations with Mohamed R., a speaker from Mogambo, Somalia currently living in Columbus, Ohio. These interviews were recorded using an Edirol recorder and were subsequently transcribed. The interviews were conducted weekly during the academic year over the course of 4 quarters from January 2011 to June 2012, with additional sessions during the 2012-2013 academic year.

Chapter 1 of the thesis gives an overview of the phonological inventory of the language. In addition, it introduces the basic morphological structures seen throughout the thesis specific to verbs, along with the tonal inventory of the language. It also gives a brief introduction to Autosegmental Phonology, the phonological framework used to analyze the language.

Chapter 2 explains the tonal patterns of the present, past and future tenses stemming from analysis of the subject (person, number) and temporal distance prefix, in addition to tonal phonological rules that can be derived from these tenses. Present tense is characterized by a penultimate tone assignment rule, in combination with toneless 1<sup>st</sup> and 2<sup>nd</sup> person subject markers and high toned 3<sup>rd</sup> person subject markers. Past tense consists of an antepenultimate tone assignment rule, in combination with toneless singular subject markers and high toned plural subject markers. Future tense shows consistency across the paradigm and displays a penultimate high despite differences in subject prefix.

## **Acknowledgments**

I would like to thank first and foremost Dr. David Odden for acting as my research advisor on this project and over the course of my undergraduate career. Secondly, I owe many thanks to Mohamed Ramedhan, who is the source of all data in this project. Without his collaboration and hard work this document would not exist today. Additionally, I must thank Dr. Robert Levine, who provided extensive feedback on this project during the Linguistics Undergraduate Research Seminar, and Dr. Brian Joseph, who has advised me generally during the course of my undergraduate career and encouraged me in my research.

I would also like to thank my fellow members of the Mushunguli working group at Ohio State, Katherine Hout, Jefferson Barlew, Brandon Yackey, Tyler Williams, and Mary Farah, and the other students in the Mushunguli Field Methods class. Kati in particular has deepened my knowledge of many aspects of the language to me that were beyond the scope of my data gathering but highly relevant to my research.

Finally I must thank my family and friends, who have endlessly supported me in my research. My parents have given me countless pieces of advice pertaining to this thesis and for that I am eternally grateful. No matter how benign the problem or esoteric the complaint, my dear friend Kelsey Shoub has always been there for me to kindly guide me in the right direction. And for all those who have helped me who I have not mentioned here by name, know that I am grateful for your support and that this thesis would not be here without you.

Despite the best efforts of those who have guided me during this thesis, it is possible that there are errors contained within. Any error in transcription or analysis is mine, and mine alone.

## Chapter 1: Introduction

### 1. Language Background

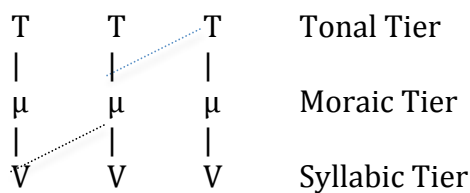
Mushunguli is a Bantu language spoken in southern Somalia by a population of around 20,000 people. This study attempts to explain the underlying morphological and phonological processes that contribute to the tone found in some verbal forms of this language. This study was conducted through interviews and elicitations with Mohamed R., a speaker from Mogambo, Somalia currently living in Columbus, Ohio. These interviews were recorded using an Edirol recorder and were subsequently transcribed. The interviews were conducted weekly during the academic year over a two-year period. Any mistakes in transcription found within are mine alone.

Chapter 1 of the thesis gives an overview of the phonological inventory of the morphological structure and the tonal inventory of the language, along with an introduction to the phonological framework used to represent the language. Chapter 2 explains the tonal patterns of the present, past and future tenses stemming from analysis of the subject (person, number) and temporal distance prefix, in addition to tonal phonological rules that can be derived from these tenses.

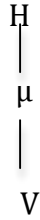
### 2. Basis in Theory

#### i. Autosegmental Theory

Goldsmith's dissertation (1976) set out to develop a phonological framework that addressed the patterning of tonal languages, such as Mushunguli and other Bantu dialects. The analysis herein operates under Goldsmith's Autosegmental Phonology, as the subject addressed is primarily focused on tonal patterns with little interaction from other tiers. An example of the tiers which are discussed in this work can be found below.



Each of these features, tones, morae, and syllables, associate with one another by the above *solid* association lines. If a feature is associated to a syllable, the syllable is said to possess that quality. For example, if a syllable is associated with one mora, and that mora is associated with a high tone, then the result will be a high-toned, mono-moraic syllable. An example of this autosegmental representation can be seen below.



Through the application of rules, features can be associated to other features. The act of association is represented by a *dotted* association line. An example of this process can be seen below.



Additionally, disassociation is marked by a solid association line perpendicular with two horizontal lines. Once disassociated, these features are no longer linked and therefore no longer possess these qualities. An example of diassociation can be seen below.



Finally, features can be multiply linked. Limits on linking are language specific and not able to be generalized at a theory level. In this thesis, I specifically address the behavior of tones, syllables, and morae. As the scope of this thesis is limited, and within this data morae only play a large factor in the context of penultimate lengthening, they are only represented within the elaboration of this rule. Syllables are represented by the letter V, morae by the symbol μ, low tones by L and high tones by H.

## ii. Tone Specific considerations

The language has two surface tones, high and low. In this thesis, high tones are marked with an acute accent, while low tones remain unmarked, with the exceptions of long vowels wherein one mora is high and the other is low. When two high tones appear adjacently on the tonal tier, a downstep is inserted. This downstep is indicated in transcription by means of a superscript exclamation point (!). This process is discussed in more depth in chapter 2.

Words in the language exhibit certain tonal properties regardless of their syntactic category. All words in citation form must have at least one high tone. One of the word's high tones is assigned to either the penultimate syllable or the antepenultimate syllable. Finally, words can be of two underlying types: those with an underlying high tone and those without. Within the context of verbs, all stems are underlyingly toneless. Surface tone is assigned by virtue of the verb tense, the underlying tone of any affixes that may attach to it, or the default tone assignment rule, to be discussed in more detail in Section 1 of Chapter 2.

### iii. Phonology vs. Morphology

Many of the processes that are laid out in this thesis without a doubt are triggered by both phonological and morphological phenomena. Many rules are dependent on certain morphological categories such as tense, person or number. However, the tones in this language also behave according to well-attested phonological rules seen in other tonal languages. With both of these facts in mind, I do not make any attempt in this thesis to distinguish between those rules which are purely morphological in nature and those which are purely phonological.

### 3. Morphology

I give a brief overview of Bantu verbal morphology, as it is highly relevant to this study. Verbs are made up of a verbal root, prefixes to indicate the verb's subject and object, or grammatical tense, along with a suffix to indicate mood. Examples of the present tense verbal paradigm can be seen below in (1).

- (1)
- |                                |                      |
|--------------------------------|----------------------|
| ku-hangúús-a                   | 'to wipe'            |
| inf.- <i>wipe</i> -indic.      |                      |
| na-hangúús-a                   | 'I am wiping'        |
| 1sg.pres.- <i>wipe</i> -indic. |                      |
| wa-hangúús-a                   | 'you sg. are wiping' |
| 2sg.pres- <i>wipe</i> -indic.  |                      |
| a-há'ngúús-a                   | 'he is wiping'       |
| 3sg.pres- <i>wipe</i> -indic.  |                      |
| cha-hangúús-a                  | 'we are wiping'      |
| 1pl.pres- <i>wipe</i> -indic.  |                      |
| mwa-hangúús-a                  | 'you pl. are wiping' |
| 2pl.pres- <i>wipe</i> -indic.  |                      |
| wa-há'ngúús-a                  | 'they are wiping'    |
| 3pl.pres- <i>wipe</i> -indic.  |                      |

Additionally, verbal extensions can be affixed to the stem to give the verb causative, passive, intensive, reciprocal or other meanings. Many of these extensions have been lexicalized, and therefore are unmarked. Examples of verbs with verbal extensions can be seen below in (2).

- (2)
- |                        |                                 |
|------------------------|---------------------------------|
| chi-lim- <b>iir</b> -a | 'we are farming for each other' |
|------------------------|---------------------------------|

wa-hisab-**iraan**-a

'they are counting each other, for each other'

Especially when considering phonological rules, it is essential to distinguish between the verbal root, the verbal stem, and the macro-stem<sup>1</sup>, as tonal behavior varies depending on which of these domains it is linked to. The root is the basic unit of the verb, essential to making a grammatical statement and containing the core semantic meaning. The stem consists of the verbal root, any extensions that the verb may possess, and the final vowel. Specific examples of each of these categories can be seen below in (3). The part of the word referred to in each category is bolded.

(3) **Root**

ku-**piik**-a

'to cook'

chi-**limiir**-a

'we are farming for each other'

wa-**hisabiraan**-a

'they are counting each other'

na-**hangalisaany**-a

'I am carrying lots of things'

mwa-m-**himiiz**-a

'you (pl.) are advising him'

cha-a-**to**-a

'we are beating them'

a-ni-**dondol**-a

'he is grabbing me'

**Stem**

ku-**piik**-a

'to cook'

chi-**limiir**-a

'we are farming for each other'

wa-**hisabiraan**-a

'they are counting each other'

na-**hangalisaany**-a

'I am carrying lots of things'

mwa-m-**himiiz**-a

'you (pl.) are advising him'

cha-a-**to**-a

'we are beating them'

a-ni-**dondool**-a

'he is grabbing me'

---

<sup>1</sup> The macro-stem includes the stem (that is, the root, extensions, and final vowel) along with any object prefixes, excluding subject and temporal prefixes. This is particularly relevant to the study of tonal patterns in verbs with object prefixes, but is not addressed specifically in this thesis.

For reference, a table of subject, object, and temporal prefixes can be found below in (4). These prefixes are not marked for tone, as they never appear in isolation.

(4)

<b>Present Tense Subject Prefixes</b>		
	<b>Singular</b>	<b>Plural</b>
1 <sup>st</sup>	/ni-a-/	/chi-a-/
2 <sup>nd</sup>	/wa-a-/	/mwa-a-/
3 <sup>rd</sup>	/a-a-/	/wa-a-/
<b>Past Tense Subject Prefixes</b>		
	<b>Singular</b>	<b>Plural</b>
1 <sup>st</sup>	/si-/	/chi-/
2 <sup>nd</sup>	/ku-/	/m-/
3 <sup>rd</sup>	/ka-/	/wa-/
<b>Object Prefixes</b>		
	<b>Singular</b>	<b>Plural</b>
1 <sup>st</sup>	/n(i)-/	/chi-/
2 <sup>nd</sup>	/ku-/	/m-/
3 <sup>rd</sup>	/m-/	/wa-/
<b>Miscellaneous</b>		
Infinitival marker	/ku-/	
Temporal marker <sup>2</sup>	/na-/	

---

<sup>2</sup> An initial hypothesis suggests that this prefix indicates distance in time either further in the future or further in past depending on which tense prefix it is affixed to. However, upon further consultation with our informant it would be unwise to suggest that this is an accurate and all encompassing semantic description of this prefix. Its exact semantic meaning is beyond the scope of this thesis.



#### 4. Phonological Inventory

A phonemic inventory of the consonants of the language can be seen below in (5).

(5)

		Labial	Alveolar	Postalveolar	Palatal	Velar	Glottal
Plosives	Voiced	b	d		ɟ	g	
	Voiceless	p	t			k	
Nasal		m	n			ŋ	
Tap or Flap			ɾ				
Fricative	Voiced	v	z				
	Voiceless	f	s	ʃ			h
Affricate	Voiceless			tʃ			
Approximant		w	l		j		

A phonemic vowel inventory can be seen below in (6).<sup>3</sup>

(6)

	Front	Placeless	Back
High	i		u
Non-High	e	a	o

---

<sup>3</sup> This table is adapted from Hout (2012).

## 5. Note on Transcription and Orthography

Over the course of this research, the Mushunguli working group developed an orthography that does not use specialized phonetic characters to better suit the needs of the Mushunguli community and ease the work of researchers. The data in this thesis, with some possible exceptions, is written in this orthography. An overview of these differences can be seen below in (7).

(7)	<i>IPA Transcription</i>	<i>Mushunguli Orthography</i>
	ŋ	ng'
	ɾ	r
	z/ð <sup>4</sup>	z
	ʃ	sh
	ʒ	j
	tʃ	ch
	ʒ	j
	j	y

Additionally, it should be noted that certain underlying vowel combinations surface differently. In this thesis, I attempt to properly transcribe the underlying vowels of various affixes in order to better reflect the tonal system, however, these vowels are phonetically realized differently. A full description of the vowel behavior of Mushunguli is beyond the scope of this thesis. Readers are directed to Hout (2012) for more information concerning Mushunguli vowels.

---

<sup>4</sup> These two consonants surface in free variation. Other sources may use <dh> to represent this sound, however I dislike the use of digraphs in this context. As such, it is my personal preference to use <z>.

## Chapter 2

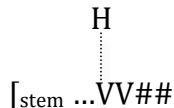
### 1. Present Tense

Tonal patterns in present tense forms can be explained through the interaction of several morphologically specific rules. Verbal infinitives in Mushunguli consist of the toneless prefix *ku-*, the verb root, and the mood marking suffix *-a*. Examples of these verbs in their citation form can be seen in (1) below.

(1a)	kúù-j-a	'to eat'	(1b)	ku-labúúny-a	'to chew'
	kúù-f-a	'to die'		ku-hakikíísh-a	'to make sure'
	kú-piik-a	'to cook'		ku-masawáár-a	'to draw'
	kú-liim-a	'to farm'		ku-dumúúl-a	'to cut'

Surface tone on a verb is determined by a combination of the verb's tense, and any tone contributed to the verb by a prefix, because the infinitival prefix is underlyingly toneless. The high tone seen on the verbs above in (1b) is assigned by virtue of the verb's tense. The Infinitive Tone Assignment Rule assigns a high tone to the penultimate syllable of the verb. The formalization of this rule can be seen below in (2).

#### (2) Infinitive and Present Tense Tone Assignment



It is important to note that if the H cannot be assigned to a mora in the stem, the rule fails. Examples of the direct effect of this rule on verbs can be seen below in (3) in several more infinitival forms.

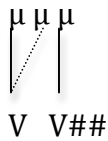
(3)	ku-fikííri <sup>5</sup>	'to think'	ku-hisááb-a	'to count'
	ku-labúúny-a	'to chew'	ku-songóól-a	'to peel'
	ku-dirifiísh-a	'to tease'	ku-konyéék-a	'to be bent'
	ku-dondóól-a	'to grab'	ku-chumalíís-a	'to be stubborn'
	ku-gulúúk-a	'to run'	ku-hangúús-a	'to wipe'

However, you may note that all penultimate syllables are long and that both morae possess level high tones. The penultimate lengthening rule is applied after the infinitive and present tense tone rule, and therefore both morae have high tones. A formalization of the penultimate lengthening rule can be seen below in (4).

---

<sup>5</sup> This verb is an exception and does not possess a final mood-marking verb. It ends with *-i* in all circumstances, as it is a loan from Arabic.

#### (4) Penultimate Lengthening Rule

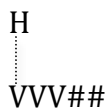


The rules in (2) and (4) do not account for the tonal behavior seen in shorter verb stems. The surface forms of verbs with disyllabic or monosyllabic stems, as seen in (1a) with *kú-piik-a* ‘to cook’ and *kúù-j-a* ‘to eat,’ must be accounted for through other rules. More examples of mono- and disyllabic verb stems can be seen in (5).

- |       |            |            |            |              |
|-------|------------|------------|------------|--------------|
| (5a.) | kú-siiny-a | ‘to see’   | kú-fuuny-a | ‘to pinch’   |
|       | kú-liim-a  | ‘to farm’  | kú-fuund-a | ‘to knot’    |
|       | kú-soom-a  | ‘to read’  | kú-fuug-a  | ‘to tame’    |
|       | kú-loot-a  | ‘to dream’ | kú-sool-a  | ‘to take’    |
|       | kú-loong-a | ‘to speak’ | kú-taag-a  | ‘to sell’    |
|       | kú-viind-a | ‘to hunt’  | kú-heem-a  | ‘to breathe’ |
- 
- |       |         |          |         |          |
|-------|---------|----------|---------|----------|
| (5b.) | kúù-j-a | ‘to eat’ | kúù-f-a | ‘to die’ |
|-------|---------|----------|---------|----------|

We first account for the behavior of verbs with disyllabic stems, those seen in (5a), while the unique tonal behavior of the lengthened penultimate syllable seen in (5b) is discussed later. Within the context of the infinitive and the present tense, the first syllable of the stem cannot be assigned a high tone. This constraint blocks the proposed Infinitive and Present Tense Tone Assignment rule, so the high tone on the verbs in (5a.) must be assigned by other means. The Default Tone assignment rule assigns a high tone to the antepenultimate syllable of a verb when the verb possesses no other high tones. It is a fact of the language that every prepausal word must have a high tone. When the tone from the Present Tense assignment rule fails to be assigned to the penultimate syllable, it is utilized by the Default Tone Assignment rule. The formalization of this rule can be seen below in (6), while an example of the process can be seen in (7). It should be noted that in this iteration the rule occurs before penultimate lengthening.

#### (6) Default Tone Assignment (Iterative)



- |     |            |    |            |    |            |
|-----|------------|----|------------|----|------------|
| (7) | H          | -> | H          | -> | H          |
|     | x          |    |            |    |            |
|     | ku-pik-a## |    | ku-pik-a## |    | ku-pik-a## |

Monosyllabic stems seen in (5b) pose unique challenges because of their short length. These tonal patterns are the result of the penultimate syllable lengthening. Infinitive and Present Tense Tone Assignment does apply, but cannot be reassigned due to the stem constraint of the prepausal reassignment rule. However, as stated in Chapter 1, all words must have some kind of high tone. Because the Default Tone Assignment Rule seen above in (6) is iterative, it applies after the penultimate lengthening rule and can therefore explain the high tone for these monosyllabic verb stems. Additionally, after the application of all morpho-phonological rules, Default Low Tone Assignment occurs, assigning any unassociated syllables a low tone. The formalization of this rule can be seen below in (8).

(8) **Default Low Tone Assignment Rule**



An example of this process can be seen below in (9).

(9) **H** *Infinitive and Present Tense Tone Assignment failure*

ku-j-a

**H** *Default Tone Assignment failure*

x  
ku-j-a

ku-j-a -> kuu-ja *Penultimate Lengthening*

**H** *Default Tone Assignment*

kuu-j-a

**H L L** *Default Low Assignment*

ku u-j-a

The end result of this concurrent HL sequence on a long vowel is the surface falling tone, seen in monosyllabic verbs.

The above rules account for the basis of verbal tone behavior in infinitives. Additionally, present tense forms are also subject to these rules. The 1<sup>st</sup> and 2<sup>nd</sup> person forms of this tense can be explained through an extension of the Infinitive Tone Assignment rule, as the prefixes for these forms are similarly toneless, just like the *ku-* infinitival prefix. The above rules that operate to influence the tone of the infinitive also operate similarly in the present tense. Examples of these forms can be seen below in (10).

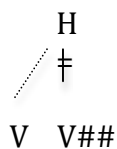
(10)	na-fikííri	'I am thinking'	cha-hisáàb-a	'we are counting'
	wa-labúúny-a	'you sg. are chewing'	mwa-songóòl-a	'you pl. are peeling'
	na-dirifíísh-a	'I am teasing'	cha-konyéèk-a	'we are being bent'
	ná-loot-a	'I am dreaming'	chá-sool-a	'we are taking'
	wá-loong-a	'you sg. are speaking'	mwá-taag-a	'you pl. are selling'
	náà-j-a	'I am eating'	cháà-j-a	'we are eating'
	wáà-j-a	'you sg. are eating'	mwáà-j-a	'you pl. are eating'

However, 3<sup>rd</sup> person forms of the present tense behave differently because their subject prefixes carry a high tone underlyingly. Their behavior is accounted for in three different sections, as above, those of the longer stems, disyllabic stems, and monosyllabic stems. Disyllabic stems are addressed first due to their simplicity compared with other 3<sup>rd</sup> person forms. Examples of disyllabic paradigms in the present tense can be seen below in (11).

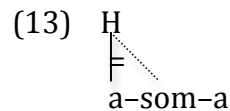
(11)	kú-fiis-a	'to hide'		
	ná-fiis-a	'I am hiding'	chá-fiis-a	'we are hiding'
	wá-fis-a	'you (sg.) are hiding'	mwá-fiis-a	'you (pl.) are hiding'
	<b>a-f íís-a</b>	'he is hiding'	<b>wa-f íís-a</b>	'they are hiding'
	kú-soom-a	'to read'		
	ná-soom-a	'I am reading'	chá-soom-a	'we are reading'
	wá-soom-a	'you (sg.) are reading'	mwá-soom-a	'you (pl.) are reading'
	<b>a-sóóm-a</b>	'he is reading'	<b>wa-sóóm-a</b>	'they are reading'
	kú-siiny-a	'to look'		
	ná-siiny-a	'I am looking'	chá-siiny-a	'we are looking'
	wá-siiny-a	'you (sg.) are looking'	mwá-siiny-a	'you (pl.) are looking'
	<b>a-sííny-a</b>	'he is looking'	<b>wa-sííny-a</b>	'they are looking'

The third person form undergoes Infinitive and Present Tense Tone Assignment, then Prepausal Tone Reassignment. Evidence from nouns in Mushunguli suggest that across the language high tones cannot appear prepausally. As such, I posit a Prepausal Tone Reassignment Rule which reassigns high tones on final syllables to the penultimate syllable. This rule is formalized below in (12).

(12) **Prepausal High Rule**



Additionally, these stems are disyllabic, so the high tone that would normally associate with the penultimate syllable is blocked because it is the first syllable in the verbal stem. The high tone of the prefix moves rightward to the following syllable, as seen below in (13).



The high tone on the third person prefixes delinks, and then links to the immediately following syllable. The formalization of the third person high tone delinking can be seen below in (14).

(14) **3<sup>rd</sup> Person Present Prefixal High Tone Reassignment**



Examples of the 3<sup>rd</sup> person present tense for monosyllabic stems can be seen below in (15).

(15)	áá-j-a	'he is eating'	áá-f-a	'he is dying'
	wáá-j-a	'they are eating'	wáá-f-a	'they are dying'

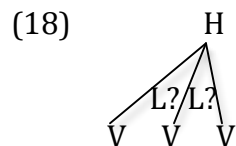
As above, the penultimate syllables of these verbs undergo lengthening. This is unlike the infinitive and 1<sup>st</sup> and 2<sup>nd</sup> person present tense forms, however, because the high is assigned before lengthening occurs, the high is level across the long syllable. An example of this process can be seen below in (16).

(16)	H   a-j-a	<i>Present Tense Tone Assignment failure</i> (Penultimate syllable already possesses high tone)
	H   a-j-a	<i>Prefixal High Reassignment failure</i> (High tones cannot be assigned prepausally)
	H   aa-j-a	<i>Penultimate Lengthening</i>

Longer verbs in the 3<sup>rd</sup> person present tense show tonal patterns that indicate the presence of further rules. The present tense paradigm of verbs with tri-syllabic stems can be seen below in (17).

- |      |                    |                         |  |                     |                       |
|------|--------------------|-------------------------|--|---------------------|-----------------------|
| (17) | ku-dumúúl-a        | 'to cut'                |  | cha-dumúúl-a        | 'we are ...'          |
|      | na-dumúúl-a        | 'I am cutting'          |  | mwa-dumúúl-a        | 'y. (pl.) are ...'    |
|      | wa-dumúúl-a        | 'you (sg.) are cutting' |  | <b>wa-dú'múúl-a</b> | 'they are ...'        |
|      | <b>a-dú'múúl-a</b> | 'he is cutting'         |  |                     |                       |
|      |                    |                         |  |                     |                       |
|      | ku-gulús-a         | 'to chase'              |  | cha-gulús-a         | 'they are chasing'    |
|      | na-gulús-a         | 'I am chasing'          |  | mwa-gulú-sa         | 'you (pl.) are chas.' |
|      | wagulúsa           | 'you (sg.) are chasing' |  | <b>wa-gú'lús-a</b>  | 'they are chasing'    |
|      | <b>a-gú'lús-a</b>  | 'he is chasing'         |  |                     |                       |

In (16), we note the appearance of a downstep in the 3<sup>rd</sup> person forms. Whenever two highs appear adjacently on the tonal tier in Mushunguli, an unassociated low tone is inserted. This applies *after* the Twin Sister Convention simplifies high tones associated with the same syllable, as seen in 3<sup>rd</sup> person disyllabic present forms. Additionally, downstep does not apply when there is a high linked to multiple TBUs. As a downstep is represented on the tonal tier by an unassociated low tone, it would be exceedingly difficult to represent formally if it were inserted between the associations of a multiply-linked high, as seen in the confusing diagram in (18).

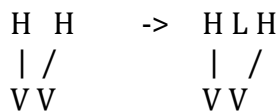


An example of downstep insertion within the process of 3<sup>rd</sup> person tone assignment can be seen below in (19).

- (19)
- |            |   |    |            |   |    |            |   |   |
|------------|---|----|------------|---|----|------------|---|---|
| H          | H | -> | H          | H | -> | H          | L | H |
|            |   |    |            |   |    |            |   |   |
| wa-dumul-a |   |    | wa-dumul-a |   |    | wa-dumul-a |   |   |

This rule's formalization can be seen below in (20).

(20) **Downstep Insertion Rule**



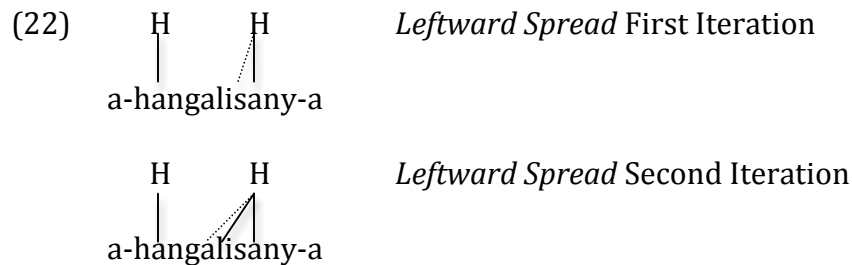
The present tense paradigms of longer stem verbs can be seen below in (21).

- |      |                          |                             |  |                           |                  |
|------|--------------------------|-----------------------------|--|---------------------------|------------------|
| (21) | ku-hangalisáány-a        | 'to carry lots of things'   |  | cha-hangalisáány-a        | 'we are...'      |
|      | na-hangalisáány-a        | 'I am carrying...'          |  | mwa-hangalisáány-a        | 'you(pl.) are..' |
|      | wa-hangalisáány-a        | 'you (sg.) are carrying...' |  | <b>wa-há'ngálísáány-a</b> | 'they are...'    |
|      | <b>a-há'ngálísáány-a</b> | 'he is carrying...'         |  |                           |                  |



ku-chimalíís-a	'to be stubborn'		
na-chimalíís-a	'I am being stubborn'	cha-chimalíís-a	'we are...'
wa-chimalíís-a	'you sg. are being stubborn'	mwa-chimalíís-a	'you pl. are...'
<b>a-chí'málíís-a</b>	'he is being stubborn'	<b>wa-chí'málíís-a</b>	'they are...'

Within verbs in this language, there are no sequences of HLH. This phenomenon indicates the presence of a plateauing phenomenon, which compensates for the appearance of such sequences. Without such a rule we would expect examples such as *\*a-há'ngalisány-a* which are unattested in the language. The verbs above are examples of leftward spreading, which is an optional rule that occurs in all verb forms. An illustration of leftward spreading can be seen below in (22).



Downstep insertion then occurs. A formalization of this optional rule can be seen below in (23).

(23) **Leftward Spreading (Optional) (Iterative)**



The reader should note that there are no examples of verbs in the 3<sup>rd</sup> person present with a high tone from leftward spreading. Surface forms such as *\*áháng'álísánya* and *\*wá-chí'málíís-a* are unattested. These data indicate the presence of a further rule which assigns a high to the initial syllable in the word. The formalization of this rule can be seen below in (24).

(24) **Initial Low Assignment**



The data below in (24) show cases of words without Leftward Spreading in the left hand column, and that same word with Leftward Spreading on the right. It should be emphasized that Leftward Spreading occurs in infinitival, and 1<sup>st</sup> and 2<sup>nd</sup> person forms, in addition to the 3<sup>rd</sup> person. Examples of these forms can be seen below.

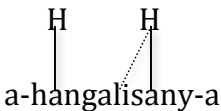
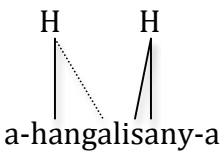

(25)	na-himíz-a	ná-hímíz-a	'I am advising'
	wa-hangalisány-a	wá-hángálísány-a	'you sg. are carrying lots of things'
	cha-hisáb-a	chá-hísáb-a	'we are counting'
	ku-labúny-a	kú-lábúny-a	'to chew'
	mwa-songól-a	mwá-sóngól-a	'you pl. are peeling'
	ku-dirífish-a	kú-dírífísh-a	'to tease'
	cha-konyék-a	chá-kónyék-a	'we are being bent'

It should be noted that forms such as *\*na-hímíz-a* and *\*wa-hángálísány-a* are unattested as leftward spreading must be applied until the word boundary or until it reaches another barrier on the tonal level.

Additional variants of the 3<sup>rd</sup> person present forms can be found below in (26).

(26)	a-hángá'lí'sány-a	'he is carrying lots of things'	wa-hángálí'sány-a	'they are...'
	a-hákí'kísh-a	'he is making sure'	wa-hákí'kísh-a	'they are...'
	a-másá'wár-a	'he is drawing'	wa-másá'wár-a	'they are...'

In the above examples, plateauing could not be achieved by means of the leftward spreading rule alone. When the optional leftward spreading rule fails to satisfy the verbal plateauing requirement, rightward spreading is applied. An example of rightward spreading and leftward spreading working in tandem can be seen below in (27).

(27)		<i>Leftward Spreading</i>
		<i>Rightward Spreading</i>
		<i>Downstep Insertion</i>

In summation, the ordering of all phonological rules that affect present tense verbal tone can be seen below in (28).

- (28)
1. Infinitive and Present Tense Tone Assignment
  2. Prepausal High Tone Reassignment
  3. Stem-Initial Reassignment
  4. Prefixal High Tone Reassignment
  5. Initial Low Tone Assignment
  6. Leftward Spreading (Optional) (Iterative)
  7. Rightward Spreading (Iterative)
  8. Downstep Insertion
  9. Default High Tone Assignment (Iterative)
  10. Default Low Tone Assignment

As many of these rules are iterative, this strict numbered ordering is an incomplete picture of the true nature of the phonological system.

The Default Low Assignment Rule requires that all TBUs not associated with a tone link to a low tone. Its formalization can be seen below in (29).

(29) **Default Tone Assignment Rule**

L  
⋮  
V'

However, there is some debate as to the true nature of the Infinitive and Present Tense Tone Assignment rule. It is possible that instead of assigning the tone to the penultimate mora directly, the tone may be initially assigned to the final syllable, and then reassigned one mora leftward. Although in citation form, word final tone does not arise, evidence from nouns and verb phrases suggests that word final high tones arise when the word is not prepausal. This indicates that when verbs are not phrase final they may be able to hold tone on their final syllables. Examples of this phenomenon in nouns can be seen below in (30).

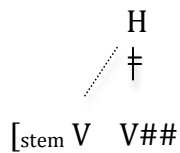
- (30) chib**ón**kho ‘rhinoceros’ chibon**khó** !chédi ‘good rhinoceros’

The formalization of this alternate rule system can be seen below in (31) and (32).

(31) ***Alternate Infinitive and Present Tense Tone Assignment***

H  
⋮  
V##

(32) **Prepausal High Rule**



Although the two alternate rules may best represent the behavior of tones across the language, these rules do present certain theoretical difficulties. Because the Prepausal High Reassignment is only reassigned within the limits of the stem, this rule cannot be easily extended to nouns in the language, although nouns do exhibit similar reassignment behavior. Additionally, the derivation of disyllabic stems in the present tense, along with 3<sup>rd</sup> person present forms to be discussed later, is made significantly more complicated by the “two rule solution” as the above rules are referred to. For the reason of simplicity, I support the one rule solution, and acknowledge that tones in phrases behave differently.

## 2. Past Tense

The past tense differs from the present tense in the underlying tone of its subject prefixes. While in the present tense subject prefixes in the 3<sup>rd</sup> person carry high tones, the plural subject prefixes in the past tense carry high tones. Examples of several past tense verb paradigms can be seen below in (33). Please note that these examples exclude instances of leftward spreading.

(33)	ku-piríík-a	'to jump'		
	si-píriik-a	'I jumped'	chi-pí'ríík-a	'we jumped'
	ku-píriik-a	'you sg. jumped'	m-pí'ríík-a	'you pl. jumped'
	ka-píriik-a	'he jumped'	wa-pí'ríík-a	'they jumped'
	ku-hakikíísh-a	'to make sure'		
	si-hakíkiish-a	'I made sure'	chi-hákí'kíísh-a	'we made sure'
	ku-hakíkiish-a	'you sg. made sure'	m-hákí'kíísh-a	'you pl. made sure'
	ka-hakíkiish-a	'he made sure'	wa-hákí'kíísh-a	'they made sure'

Verbs in the past tense are assigned a high tone on the antepenultimate syllable. An example of this process can be seen below in (34) and its formalization can be seen in (35).

(34)	H
	⋮
	ka-hakikish-a

### (35) Past Tense Tone Assignment Rule

H
⋮
VVV##

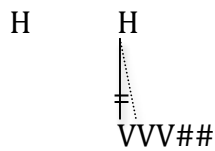
Unlike in present tense verbs, where the tones pattern similarly in 3<sup>rd</sup> person forms, past tense verbal patterns are differentiated by number. First, second and third person *singular* past tense verbs all possess a toneless prefix, while their plural equivalents possess a floating high tone. These high tone prefixes behave differently than the 3<sup>rd</sup> person prefixes in the present tense. The plural past tense prefixes have a high tone which is unassociated, and this unassociated high tone is assigned one mora rightward.

### (36) Prefixal High Tone Assignment

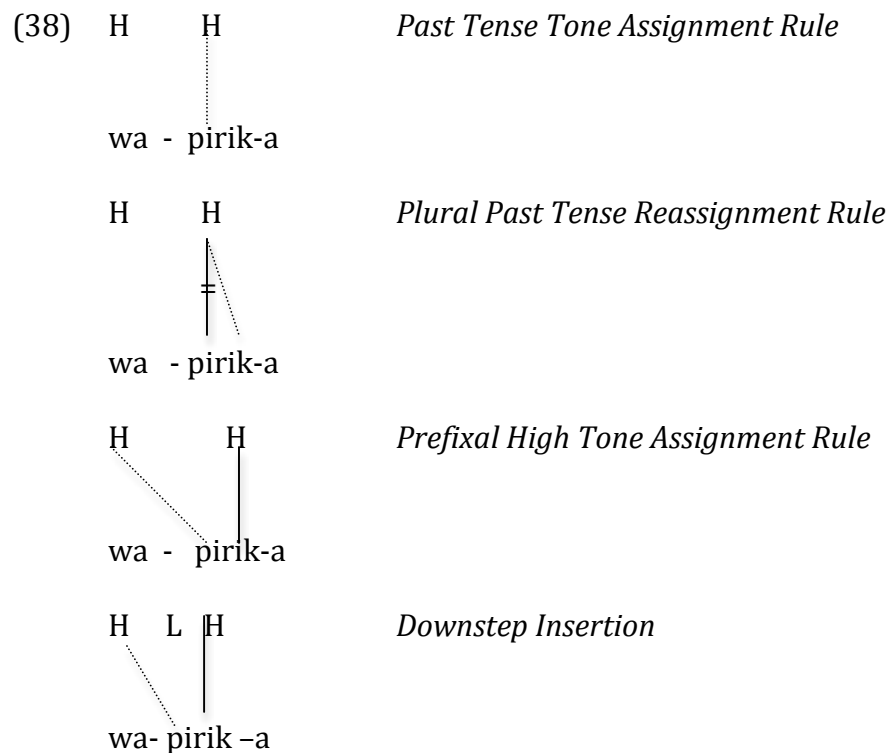
H
⋮
V V

However, this poses a problem as the past tense plural forms have a high tone on the penultimate and antepenultimate syllables as opposed to the antepenultimate and the antepenultimate. I propose a reassignment rule that occurs with past tense plural forms, which pushes the high tone assigned by the Past Tense Tone Assignment Rule to the penultimate syllable, allowing the prefixal high tone to be assigned to the antepenultimate syllable. Of course, this reassignment rule must take place before the Prefixal High Tone Assignment. This reassignment rule is triggered by the appearance of another high preceding the tone on the tonal tier. The formalization of the Plural Past Tense Reassignment Rule can be seen below in (37).

(37) **Plural Past Tense Reassignment Rule**



An example of these processes can be seen below in (38).



However, in longer verbs, such as *ku-hakikish-a* 'to make sure,' there is much more variability in surface forms for past plural subjects. Examples of variations can be seen below in (39).

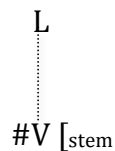
(39)

- a. chi-hákí'kísh-a      'we are making sure' (*low tone insertion & rightward spreading*)
- b. chi-há'kíkísh-a      'we are making sure' (*low tone insertion & leftward spreading*)

How can we account for this variation? Both examples show signs of fairly common leftward and rightward spreading phenomena. It could be considered more phonetically natural to spread or "bridge" these high tones to each other across the word. The variable nature of the surface forms indicates that one of the spreading rules must be optional, if not both. However, it is difficult to determine which of the two is optional due to the infrequency of such multisyllabic words. We can make the somewhat arbitrary decision that the leftward spreading is optional because this is consistent with the behavior of present tense rule ordering, but it is possible that the same ordering does not exist here. I make this choice to contribute clarity to the rule ordering process, however further evidence could easily prove otherwise. A formalization of the leftward spreading rule can be seen in part one of this chapter. It should also be noted that these verbs show examples of downstep insertion, but as this is expected considering the interactions of high tones across the language, I do not address it in detail here.

However, we must address the fact that the subject prefix never carries a high tone in this context. Although it could be due to the optionality of the leftward spreading rule, it is consistently low toned across the paradigm. As such, I feel it would be unwise to ignore this generalization, particularly considering data I present in part three of this chapter on the future tense. Therefore, I posit a Plural Prefix Low Tone Assignment Rule, which is formalized below in (40).

(40) **Past Plural Prefix Low Tone Assignment Rule**



Because I have not yet examined the consistency of this rule across phrases where the verb is not post pausal, I claim that this is a fact of the verbal form, and not a phrasal phenomenon. Further study may find that this is a phrasal phenomenon.

A paradigm of the shorter past tense verbs can be seen below in (41).

- |      |           |                  |  |             |                  |
|------|-----------|------------------|--|-------------|------------------|
| (41) | kúù-j-a   | 'to eat'         |  | chîl-j-a    | 'we ate'         |
|      | sîl-j-a   | 'I ate'          |  | mwáà-j-a    | 'you pl. ate'    |
|      | kúù-j-a   | 'you sg. ate'    |  | wáà-j-a     | 'they ate'       |
|      | káà-j-a   | 'he ate'         |  |             |                  |
|      | kú-piik-a | 'to cook'        |  | chí-'píik-a | 'we cooked'      |
|      | sí-piik-a | 'I cooked'       |  | mí-'píik-a  | 'you pl. cooked' |
|      | kú-piik-a | 'you sg. cooked' |  |             |                  |

ká-piik-a	'he cooked'	wá-'píik-a	'they cooked'
kú-loong-a	'to say'		
sí-loong-a	'I said'	chí-'lóóng-a	'we said'
kú-loong-a	'you sg. said'	mí-'lóóng-a	'you pl. said'
ká-loong-a	'he said'	wá-'lóóng-a	'they said'

The disyllabic verb stems are assigned their tones by the same processes as the longer stems seen above. The monosyllabic stems acquire their tones by means of the default tone assignment rule after the failure of the Past Tense Tone Assignment Rule.

Additionally, the Plural Prefix Low Tone Assignment Rule fails here because of the high tone that is already attached to the prefix. As such, we can posit that the Plural Prefix Low Tone Assignment Rule precedes the spreading rules as seen above in longer verbs, but follows after all other tense specific rules.

The application order of past tense rules is as follows.

- (42)
1. Past Tense Assignment Rule
  2. Plural Past Tense Reassignment Rule
  3. Prefixal High Tone Assignment Rule
  4. Past Plural Prefix Low Tone Assignment Rule
  5. Leftward Spreading (Optional)
  6. Rightward Spreading (Optional)
  7. Downstep Insertion



### 3. Future Tense<sup>6</sup>

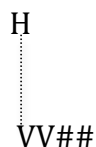
The future tense is the most straightforward of all tenses. All future tense verbs surface with penultimate high tone regardless of the subject prefix. Examples of future tense verbs in all forms can be seen below in (43).

(43)	kùù-j-a	to eat		
	na-níí-j-e	'I will eat'	na-chíí-j-e	'we will eat'
	na-ú-j-e	'you sg. will eat'	naá-m-j-e	'you pl. will eat'
	na-á-je	'he will eat'	na-wáá-j-e	'they will eat'
	kú-piik-a	'to cook'		
	na-ni-píík-e	'I will cook'	na-chi-píík-e	'we will cook'
	na-u-píík-e	'you sg. will cook'	na-m-píík-e	'you pl. will cook'
	na-a-pííke	'he will cook'	na-wa-píík-e	'they will cook'
	ku-hísaab-a			
	na-ni-hisááb-e	'I will count'	na-chi-hisááb-e	'we will count'
	na-u-hisááb-e	'you sg. will count'	na-m-hisááb-e	'you pl. will count'
	na-a-hisááb-e	'he will count'	na-wa-hisááb-e	'they will count'
	ku-hakíkíish-a			
	na-ni-hakikíísh-e	'I will make sure'	na-chi-hakikíísh-e	'we will...'
	na-u-hakikíísh-e	'yousg. will make sure'	na-m-hakikíísh-e	'you pl. will...'
	na-a-hakikíísh-e	'he will make sure'	na-wa-hakikíísh-e	'they will...'

The reader may note that the prefix *na-* introduces a host of vocalic complexities. Many of these subject prefixes are vowels, which undergo phonological changes when adjacent to the vowel in *na-*. Although I endeavor to represent these words and their underlying forms as correctly as possible, the exact and total formalization of these processes is beyond the scope of this thesis. A detailed analysis of the vocalic system of Mushunguli can be found in Hout (2012).

Considering the data in (43) above, I posit that all future prefixes are low toned, and the future tense is marked by a high tone on the penultimate syllable. The Future Tense High Tone Insertion Rule is formalized below in (44).

#### (44) Future Tense High Tone Insertion Rule



<sup>6</sup> There is some question as to the exact semantic underpinnings of this tense. However, it can be said that these forms indicate a future action or *irrealis* of some kind.

It should be noted that because the high tone is level across the penultimate syllable, it must occur before the penultimate vowel lengthening. In addition, there are cases of leftward spreading in the future tense, however these are of no additional theoretical interest as this spreading is of the same type seen in present and past tenses, both iterative and optional.

## Conclusion

In this thesis I have described the tonal behavior of the basic verbal forms of Mushunguli. It is likely that alternate workable analyses exist, involving other additional phonological rules. Present tense and infinitive verbs gain their high tone through a tense specific tone assignment rule onto the penultimate syllable, excepting disyllabic and monosyllabic verb stems. These stems are constrained by the first syllable of the stem, which does not allow a high tone to dock. As such these gain their tone through the application of the default tone assignment rule, which maps a high tone onto the antepenultimate syllable. In the present tense, 1<sup>st</sup> and 2<sup>nd</sup> person subject prefixes are toneless, while 3<sup>rd</sup> person prefixes possess a high tone. Downstep insertion, leftward spreading and rightward spreading occur in this tense, although these phenomena likely occur across the language. Additionally, I propose a possible alternate analysis of present tense tonal behavior based on tonal behavior in noun phrases. This analysis cannot be confirmed or denied without further phrasal data.

In the past tense, high tone is assigned to the antepenultimate syllable by a tense specific rule. Additionally, singular past tense subject prefixes are low toned, while plural past tense prefixes carry a floating high tone. This tense also exhibits spreading behavior and downstep insertion. The future tense behaves in the most transparent manner of all the tenses, and a high tone is assigned on the penultimate syllable. All subject prefixes in this tense are toneless.

Of course, this thesis is not a complete picture of the tonal system of verbs in Mushunguli. The question of subject prefix, object prefix and verbal stem tonal interactions is foremost among them, along with the combination of verbs with nominal subjects and objects without prefixes. These questions are worthy research questions that I hope will be addressed in the future.

It is my hope that this research will be useful for both researchers interested in Mushunguli, and the Somali Bantu community as a whole.

## References

- Clements, G.N. & E. Hume. 1995. The internal organization of speech sounds. In J. Goldsmith (ed.), *Handbook of Phonology*. Blackwell.
- Goldsmith, John. 1976. Autosegmental Phonology. Ph.D. Dissertation, Massachusetts Institute of Technology.
- Hout, Katherine. 2012. The Vocalic Phonology of Mushunguli. B.A. Thesis, The Ohio State University. Retrieved February 2013, from <http://kb.osu.edu/dspace/handle/1811/53373>.
- Kenstowicz, Michael. & Charles Kisseberth. 1990. Chizigula tonology: the word and beyond. In S. Inkelas & D. Zec(eds) *The phonology-syntax connection*, pp. 163- 194. Chicago, IL: University of Chicago Press.
- Kenstowicz, Michael. 1989. Tone and accent in Kizigua - a Bantu language. in P.M. Bertinetto & M. Loporcaro (eds). *Certamen phonologicum: papers from the 1987 Cortona Phonology Meeting*, pp. 177-188. Torino: Rosenberg and Sellier.
- Kisseberth, Charles. 1992. Metrical structure in Zigula tonology. in D. Gowlett (ed.), *African linguistic contributions*, pp. 227-259. Pretoria: Via Afrika.
- Mochiwa Z.S.M. (2008) *Kizigula: msamiati wa Kizigula-Kiswahili-Kiingereza = Zigula-Swahili-English lexicon* Dar-es-Salaam: Languages of Tanzania Project University of Dar-es-Salaam.
- Odden, David. 1996. *The Phonology and Morphology of Kimatuumbi*. Oxford: Oxford University Press.
- Odden, David. 2001. Tone shift and spread in Taita I. *Studies in African Linguistics* 30. pp. 75-110.